

Customer No.: 31561
Application No.: 10/708,372
Docket No.: 12680-US-PA

REMARKS

Present Status of the Application

Claims 12-26 remain pending of which claims 12 and 20 have been amended. The amendments to claims 12 and 20 are fully supported at paragraphs [0013], [0026] and [0035]. Therefore, it is believed that no new matter adds by way of amendment to claim 20 or otherwise to the application.

In the outstanding Office Action, Claims 12-14, 16-22 and 24-26 were rejected under 35 U.S.C. 102(b) as being anticipated by Thei et al. (US-6,335,249, hereinafter Thei); and Claims 12-26 were rejected under 35 U.S.C. 102(b) as being anticipated by Lin. et al. (US-6,211,022, hereinafter Lin).

For at least the following reasons, Applicant respectfully submits that claims 12-26 are in proper condition for allowance. Reconsideration is respectfully requested.

Discussion of the claim rejection under 35 USC 102

1. *The Office Action rejected Claims 12-14, 16-22 and 24-26 under 35 U.S.C. 102(b) as being anticipated by Thei et al. (US-6,335,249, hereinafter Thei).*

Applicants respectfully disagree and would like to point out that rejection under 35 U.S.C. 102 requires that each and every elements of the claim(s) must be disclosed exactly by a single prior art reference.

Applicants respectfully submit that Thei cannot anticipate the amended proposed independent Claim 12 because Thei substantially fails to teach or disclose each and every features of the claimed invention as claimed in the amended proposed independent Claim

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12. More specifically, Thei substantially fails to teach or disclose a shallow trench isolation comprising at least [a liner layer, formed over the substrate covering the insulating layer so that the liner layer protects the shallow trench isolation from external stress or thermal effects] as required by the amended proposed independent claim 12. The advantage of the features recited above is that at least the possibility of damage to STI due to external stress or thermal effects during the subsequent semiconductor processing can be effectively reduced.

Applicants respectfully submit that the present inventors discovered and recognized the source of the problems as to what causes the dislocations/defects of the STI, and then set out to find a remedy to such problems. According to the present inventors, when the STI are left unprotected, its exposure to external stress or thermal stress may result dislocation/defects in the STI. Accordingly, the present inventors propose forming a liner layer to cover the STI to protect the STI from external stress or thermal stress and reduce the problems of dislocation in the STI. Accordingly, Applicants would like to point out that the inquiry is not whether each element of the claimed invention existed in the prior art, but whether the prior art teach (or made obvious) the invention as a whole for which patentability is claimed. A patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified, and the question here is whether the prior art, Thei, discovered/recognized the cause of the dislocation of the STI, which the present inventors intends to solve.

Instead, Thei substantially discloses, in FIGS. 1-3, col. 5, line 1 to col. 6, line 1, a

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method of fabricating salicide FET with improved borderless contact comprising providing a substrate (10); etching the substrate to form openings and filling the openings with silicon oxide layer to form STIs (12); forming a gate oxide (14) on the device areas over the substrate (10); forming a gate electrode (16); forming a conformal metal layer over the gate electrode (16); performing a two-step RTA (RTA-1 and RTA-2) to form a metal salicide (22) on the gate electrode (16); and after forming the metal salicide on the gate electrode (16), forming a conformal etch-stop layer (24) over the STI (12) and the metal salicide (22).

Therefore, it is clear that the conformal etch-stop layer (24), which the Examiner deems equivalent to the liner layer of the present invention, is in fact formed on the metal salicide (22) (FIG. 3) after the TWO-STEP high temperature RTA PROCESS is performed. In other words, the conformal etch-stop layer (24) of Thei cannot function to protect the STI (12) during the RTAs processes because the conformal etch-stop layer (24) is formed over the STI (12) AFTER the TWO RTAs processes are performed. Because the STI (12) is exposed to RTAs processes during the formation of metal salicide (22), and therefore, according to the present inventors, defects such as dislocations in the STI (12) may occur.

Applicants would like to point out that under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates. Because the conformal etch-stop layer (24) of Thei cannot function to protect the STI (12) during the RTAs processes as the conformal etch-stop layer is formed over the STI (12) after the RTAs processes are performed, and therefore the conformal etch-

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stop layer (24) of Thei cannot inherently function as the liner layer of the claimed invention, or Thei cannot possibly teach or disclose the claimed limitations of the liner layer as claimed in the amended proposed independent claim 12. Accordingly, Applicants respectfully submit that Thei cannot possibly anticipate the amended proposed independent claim 12 of the claimed invention in this regard.

It is clearly evident that Thei substantially intends to use the conformal etch-stop layer to merely serve as an etch-stop layer for preventing over-etching of the STI (12) and for ensuring formation of contact openings in the ILD layer (28) and fails to recognize the cause of the dislocation of the STI, much less teaching on using the conformal etch-stop layer (24) to cover the STI (12) for protecting it from exposure to RTAs during the formation of metal salicide (22) (external stress or thermal effects). Accordingly, Applicants respectfully submit that Thei cannot possibly anticipate the amended proposed independent claim 12 of the claimed invention in this regard.

Thus, Thei substantially fails to teach or disclose a shallow trench isolation comprising at least [a liner layer, formed over the substrate covering the insulating layer so that the liner layer protects the shallow trench isolation from external stress or thermal effects] as required by the proposed independent claim 12, and therefore Thei cannot possibly anticipate Claim 12 in this regard.

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Because the amended proposed independent claim 20 also recites features that are similar to the proposed independent claim 12, therefore Applicants similarly submit that claim 20 also patently define over Thei for at least the same reasons discussed above.

Claims 13-14 and 16-19, and Claims 20-22 and 24-26, which directly or indirectly depend from independent Claims 12 and 20 respectively are also patentable over Thei at least because of their dependency from an allowable base claim.

For at least the foregoing reasons, Applicant respectfully submits that claims 12-14, 16-22 and 24-26 patently define over Thei. Reconsideration and withdrawal of above rejections is respectfully requested.

2. *The Office Action rejected Claims 12-26 under 35 U.S.C. 102(b) as being anticipated by Lin et al. (US-6,211,022, hereinafter Lin).*

Applicants respectfully disagree and would like to point out that the present invention as claimed in claims 12 and 20 are directed to a structure of a Shallow Trench Isolation (STI), while Lin substantially teach or disclose a conventional field oxide (FOX) 204 (obviously formed via thermal oxidation process) (please see FIG. 2, col. 2, lines 52-60), and therefore, Applicants respectfully submit that Lin cannot possibly anticipate the proposed independent claims 12 and 20.

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Claims 13-19, and claims 21-26, which directly or indirectly depend from independent claims 12 and 20, are also patentable over Lin at least because of their dependency from an allowable base claim.

For at least the foregoing reasons, Applicant respectfully submits that claims 12-26 patently define over Lin. Reconsideration and withdrawal of above rejections is respectfully requested.

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CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 12-26 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

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Respectfully submitted,

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